Fig. 1

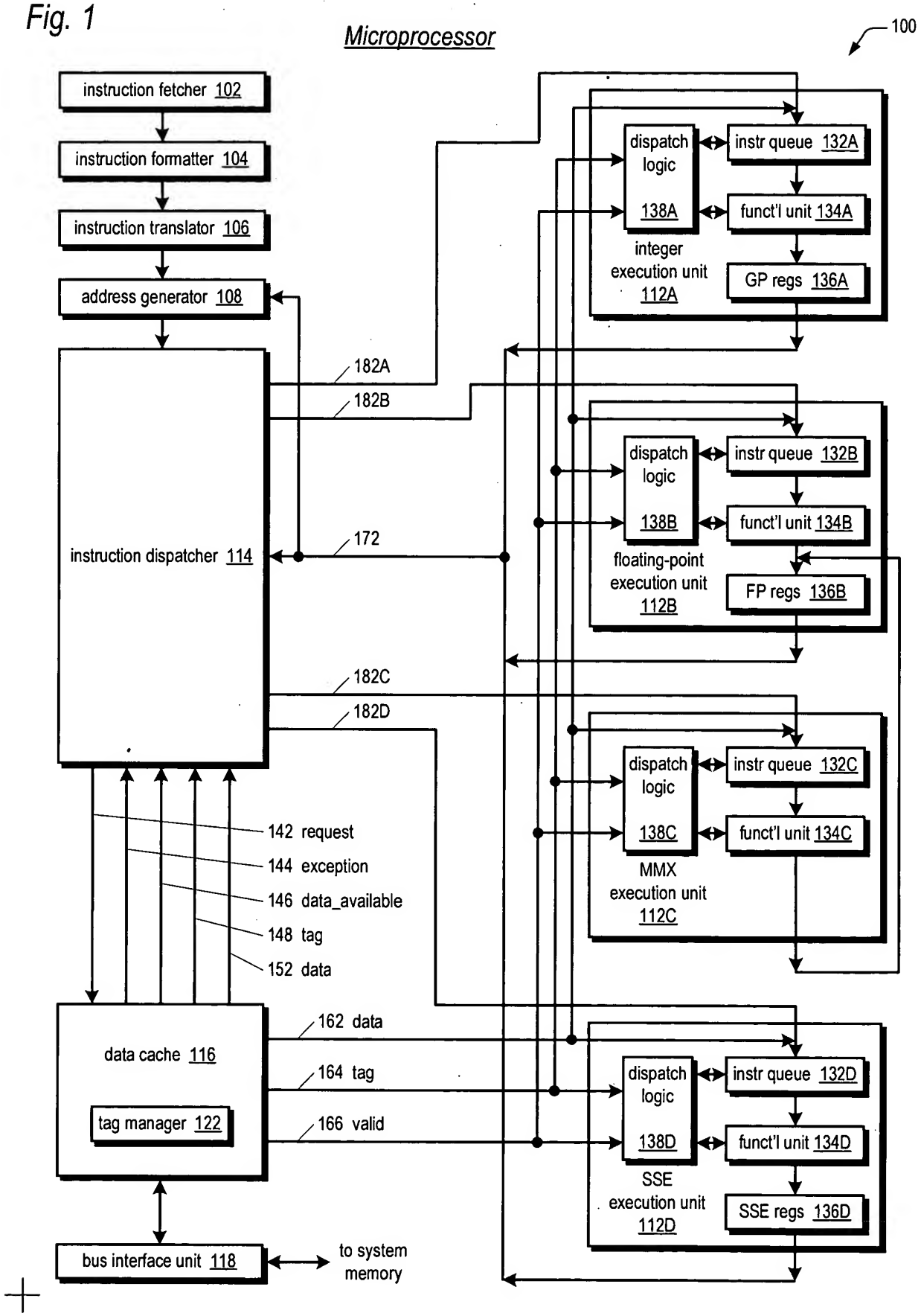

Microprocessor
100
instruction fetcher 102
instruction formatter 104
instruction translator 106
address generator 108
instruction dispatcher 114
182A
182B
172
182C
182D
142 request
144 exception
146 data_available
148 tag
152 data
data cache 116
tag manager 122
bus interface unit 118
to system memory
dispatch logic 138A
instr queue 132A
funct'l unit 134A
integer execution unit 112A
GP regs 136A
dispatch logic 138B
instr queue 132B
funct'l unit 134B
floating-point execution unit 112B
FP regs 136B
dispatch logic 138C
instr queue 132C
funct'l unit 134C
MMX execution unit 112C
162 data
164 tag
166 valid
dispatch logic 138D
instr queue 132D
funct'l unit 134D
SSE execution unit 112D
SSE regs 136D

Fig. 2

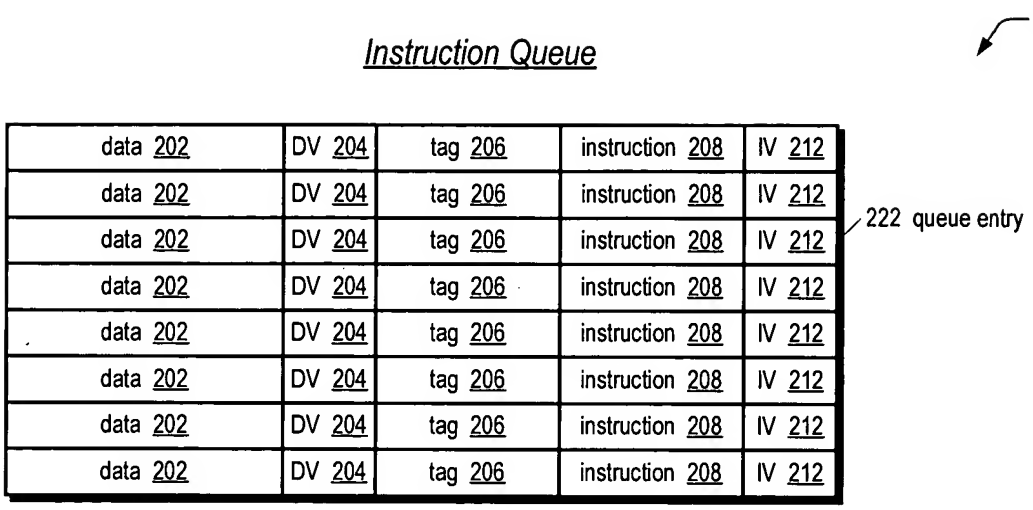

132
Instruction Queue
data 202
DV 204
tag 206
instruction 208
IV 212
222 queue entry

Fig. 3

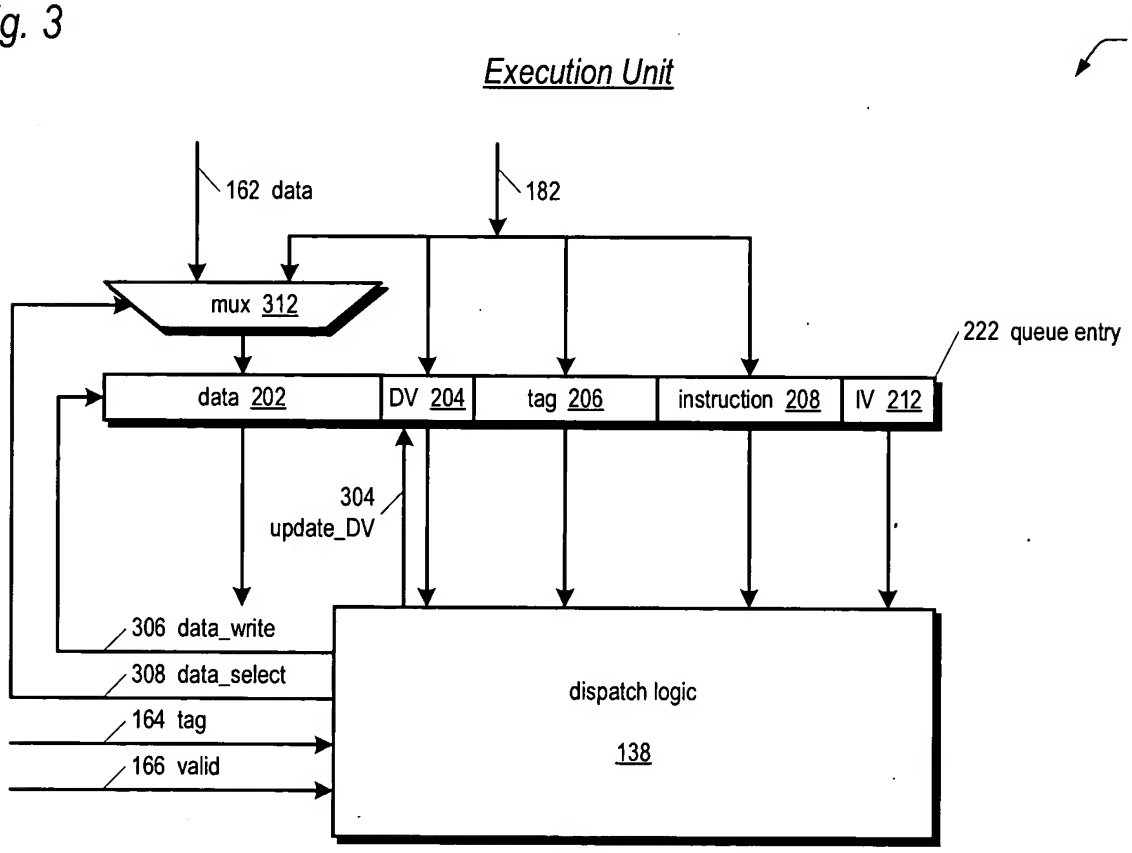
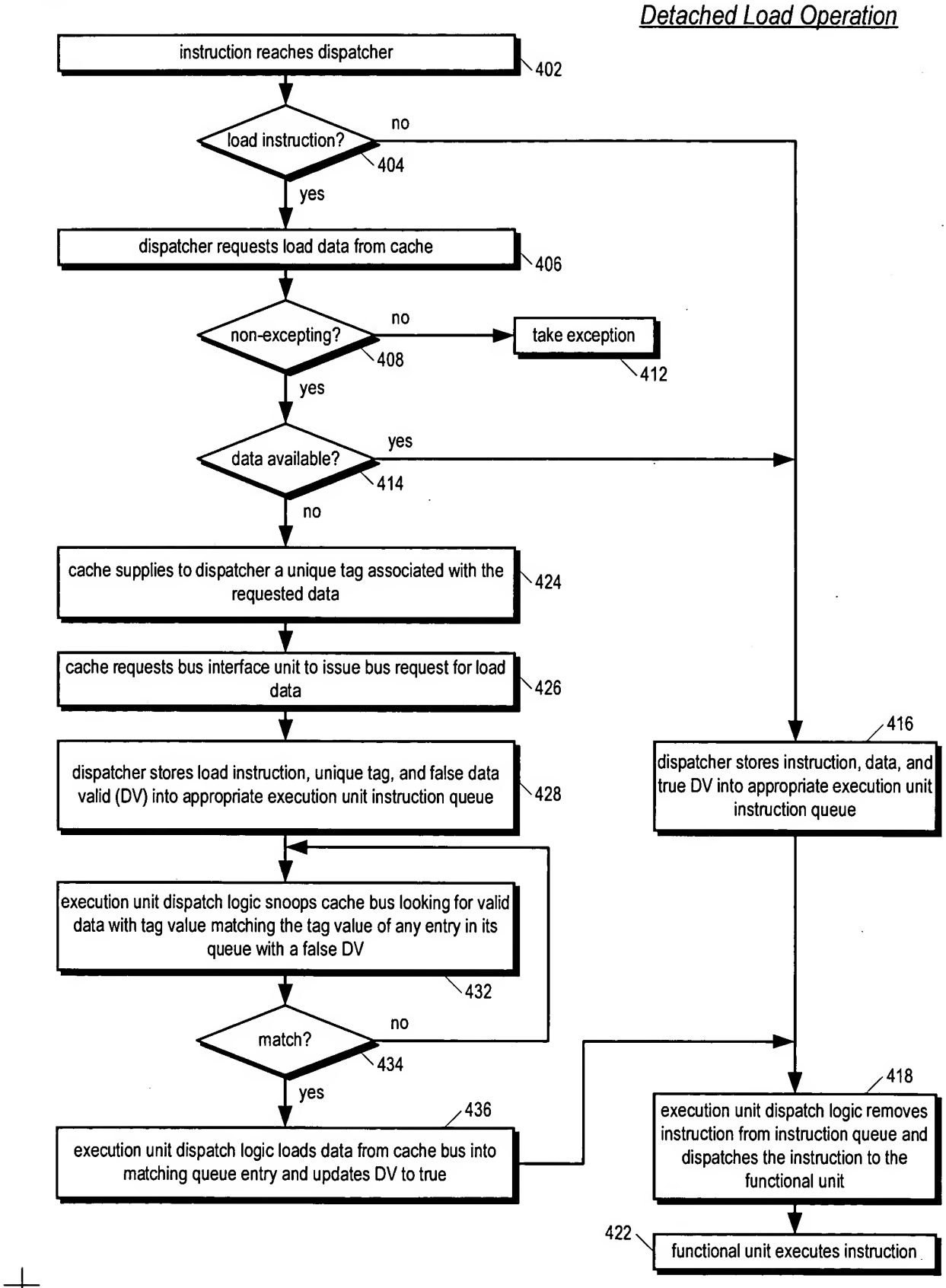

112
Execution Unit
162 data
182
mux 312
222 queue entry
data 202
DV 204
tag 206
instruction 208
IV 212
304
update_DV
306 data_write
308 data_select
164 tag
166 valid
dispatch logic
138

Fig. 4


Detached Load Operation
instruction reaches dispatcher
402
load instruction?
404
no
yes
dispatcher requests load data from cache
406
non-excepting?
408
no
take exception
412
yes
data available?
414
yes
no
cache supplies to dispatcher a unique tag associated with the requested data
424
cache requests bus interface unit to issue bus request for load data
426
dispatcher stores load instruction, unique tag, and false data valid (DV) into appropriate execution unit instruction queue
428
execution unit dispatch logic snoops cache bus looking for valid data with tag value matching the tag value of any entry in its queue with a false DV
432
match?
434
no
yes
execution unit dispatch logic loads data from cache bus into matching queue entry and updates DV to true
436
416
dispatcher stores instruction, data, and true DV into appropriate execution unit instruction queue
418
execution unit dispatch logic removes instruction from instruction queue and dispatches the instruction to the functional unit
422
functional unit executes instruction